

**WHAT IS CLAIMED IS:**

1. A digging tooth adapted to extend forward from a digging implement having a transversely extending edge, said digging tooth defining a longitudinal centerline and has a forward end portion, with a cutting edge extending thereacross and a rear end portion configured for attachment to the edge of said implement, said digging tooth further including upper and lower angularly diverging surfaces having opposed side surfaces therebetween, and with said digging tooth further including a wing projecting laterally outwardly from each side surface on said tooth, with each wing being formed integral with the remainder of said digging tooth and having upper and lower planar surfaces each extending in a direction generally paralleling the cutting edge extending across the forward end portion of the digging tooth, with the upper and lower surfaces of each wing being disposed between and in other than planar relationship relative to the upper and lower surfaces of the digging tooth, and wherein each wing has a laterally widened rear portion, a laterally narrowed forward portion, and an outer edge extending therebetween for providing said tooth with a progressively widening ground fracturing zone whereby yielding significant wear protection for the edge of the implement.
2. The digging tooth according to Claim 1 wherein each wing has first and second surfaces which, toward the outer edge thereof, converge relative to each other to provide a cutting edge for each wing.
3. The digging tooth according to Claim 1 wherein the rear end portion thereof is configured with a blind cavity for receiving and accommodating a lengthwise section of a nose

section of an adapter extending from the transversely extending edge on the digging implement.

4. The digging tooth according to Claim 3 wherein the laterally widened rear portion of each wing extends outward and forward from the rear end portion of said tooth.

5. The digging tooth according to Claim 3 wherein the blind cavity opens to a rear of said tooth and has a cross-sectional profile having a generally rhombus-like configuration for a major lengthwise portion thereof.

6. The digging tooth according to Claim 3 further defining a bore defining an axis, with said bore opening to said blind cavity defined by said tooth for accommodating at least a portion of a retaining apparatus used to releasably secure said tooth and said adapter in operable combination.

7. The digging tooth according to Claim 6 wherein each wing on the digging tooth defines a channel opening to one of said upper and lower planar surfaces on each wing and arranged in general alignment relative to each other and relative to the axis of said bore for accommodating and aligning said retaining apparatus relative to the axis defined by said bore.

8. The digging tooth according to Claim 7 wherein each wing projects laterally outward from an area on a respective side surface of the digging tooth arranged proximately midway between the upper and lower surfaces on the digging tooth such that the upper generally planar surface on each wing on the tooth is disposed and configured to protect ends of said retaining apparatus

extending beyond opposed side surfaces of the digging tooth.

9. The digging tooth according to Claim 6 wherein the retaining apparatus for releasably securing the adapter and tooth in operable combination relative to each other includes an elongated flex-pin retainer, and wherein an area of said digging tooth arranged in proximate relation relative to said bore is configured to impart radial compression to an end of said flex-pin as said flex-pin is inserted into position to maintain said tooth and adapter in operable combination.

10. The digging tooth according to Claim 6 wherein an area of said digging tooth arranged in proximate relation relative to said bore is configured to inhibit inadvertent axial shifting of said retaining apparatus relative to said adapter or tooth.

11. An elongated digging tooth adapted to extend forwardly from a digging implement having a transversely extending edge, said digging tooth defining a central axis and has a forward end portion, with a transverse cutting edge, and a rear end portion configured for attachment to the transversely extending edge of said implement, said digging tooth further including upper and lower angularly diverging surfaces having opposed side surfaces therebetween, and wherein said digging tooth further includes wing structure projecting generally horizontally and laterally outward from an area on one side of said tooth, with said wing structure being formed integral with the remainder of said digging tooth and having generally horizontal upper and lower surfaces, with the upper and lower surfaces of said wing structure being disposed between and in

other than planar relationship relative to the upper and lower surfaces of the digging tooth, with said wing structure having a rear laterally widened portion, a laterally narrowed front portion, and an outer edge extending therebetween and converging toward the central axis of said tooth whereby providing said digging tooth with a widening ground penetration zone for facilitating penetration of the transversely extending edge on the digging implement.

12. The elongated digging tooth according to Claim 11 wherein a major lengthwise section of the outer edge on said wing structure is configured with a cutting edge for promoting ground penetration of the digging tooth.

13. The elongated digging tooth according to Claim 11 wherein said wing structure is arranged on said tooth in generally symmetrical relation relative to said central axis whereby permitting said tooth to be reversed about said central axis.

14. The elongated digging tooth according to Claim 11 wherein a second wing structure is provided on and projects generally horizontally and laterally outward from an area on an opposite side of said tooth, with said second wing structure having generally horizontal upper and lower surfaces, with the upper and lower surfaces of said second wing structure being disposed between and in other than planar relationship relative to the upper and lower surfaces of the digging tooth, with said second wing structure having a rear laterally widened portion, a laterally narrowed front portion, and an outer edge extending therebetween and converging toward the central axis of said tooth whereby providing said digging tooth with a widening ground penetration zone for

facilitating penetration of the transversely extending edge on the digging implement.

15. The elongated digging tooth according to Claim 11 wherein said wing structure extends from an area on one side of said tooth proximately midway between the upper and lower surfaces of said tooth.

16. The elongated digging tooth according to Claim 11 wherein the rear end portion of the digging tooth is configured with a blind cavity for receiving and accommodating a lengthwise section of a nose section of an adapter extending from the transversely extending edge of the digging implement.

17. The elongated digging tooth according to Claim 16 wherein the rear widened portion of said wing structure extends outward and forward from the rear end portion of said tooth.

18. The elongated digging tooth according to Claim 16 further including a bore opening to said blind cavity defined by said tooth for accommodating at least a lengthwise portion of a retaining apparatus used to releasably securing said tooth and said adapter in operable combination relative to each other.

19. The elongated digging tooth according to Claim 16 further including opposed surfaces arranged within said blind cavity defined by said tooth for adding stability to said tooth after said tooth is arranged in operable combination with said adapter.

20. The elongated digging tooth according to Claim 16 wherein a marginal edge extending about said blind cavity provided at the rearward end portion of the tooth has a generally rhombus-like cross-sectional configuration.

21. The elongated digging tooth according to Claim 16 further including pair of axially aligned bores which each open to the blind cavity defined by said tooth and are disposed along an axis extending at an angle ranging between about  $25^{\circ}$  and about  $65^{\circ}$  relative to the transverse cutting edge at the forward end portion of said tooth.

22. In combination with a bucket having a forward edge with a plurality of two-part digging tooth assemblies connected to said edge in side-by-side relation relative to each other, with each digging tooth assembly including an adapter secured to said bucket at said edge, said adapter having a nose portion extending forward from said edge and to which a replaceable digging tooth is releasably secured, with each digging tooth having a forward end, with an edge transversely extending thereacross, a rear end, arranged adjacent to the bucket edge and defining a blind cavity for receiving the nose portion of said adapter, with said forward and rearward ends of said tooth being aligned relative to a central axis of the tooth, an upper surface extending forward and downwardly from the rearward end and toward the forward end of said digging tooth, and a lower surface extending forward and upwardly from the rearward end and toward the forward end of said digging tooth, and with each digging tooth further including a pair of wings extending outward and generally parallel to the forward edge on said tooth from an area on each side of the tooth proximate midway between the upper and lower surfaces of said tooth, with each wing on

said tooth having a rear laterally widened portion and a laterally narrowed front portion such that, for a major length thereof, an outer edge of each wing converges toward the central axis of said tooth from which said wing extends and diverges relative to the outer edge of a wing on an adjacent tooth, and wherein the wings on each tooth are configured to protect that portion of said bucket edge disposed between adjacent tooth assemblies against wear.

23. The invention according to Claim 22 wherein rearward ends of the outer edges of the wings on laterally adjacent digging tooth assemblies are laterally spaced by a distance ranging between about 0.5 inches and about 1.25 inches.

24. The invention according to Claim 22 wherein the wings on each digging tooth are integrally formed as part of and with the remainder of each tooth.

25. The invention according to Claim 22 wherein the digging tooth defines a bore opening to said cavity defined by said tooth for accommodating at least a portion of a retaining apparatus used to releasably secure said tooth and said adapter of each digging tooth assembly in operable combination relative to each other.

26. The invention according to Claim 25 wherein the wing on each digging tooth has first and second generally planar surfaces, and with the outer edge of the wing on each digging tooth being configured to provide each wing with a cutting edge for facilitating ground penetration.

27. The invention according to Claim 26 wherein one of said first and second generally planar surfaces of each wing on said tooth further defines an open channel arranged in general alignment with the axis of said bore defined by said tooth for accommodating and aligning said retaining apparatus with said bore defined by said tooth.

28. The invention according to Claim 26 wherein an area of said digging tooth arranged in proximate relation relative to the bore defined by said tooth is configured to impart a compressive force to said retaining apparatus as said retaining apparatus is inserted into a position to maintain said tooth and adapter in operable combination relative to each other.

29. The invention according to Claim 26 wherein an area of said digging tooth arranged in proximate relation relative to the bore defined by said tooth is configured to inhibit inadvertent axial shifting of said retaining apparatus relative to said adapter or tooth.

30. The invention according to Claim 27 wherein the generally planar surface of each wing on said tooth defining said open channel is configured to protect a lengthwise portion of said retaining apparatus extending beyond either side of said digging tooth.

31. The invention according to Claim 22 wherein each digging tooth further includes opposed surfaces arranged within said cavity for adding stability to said tooth after said tooth is arranged in operable combination with the respective adapter of said digging tooth assembly.



32. The invention according to Claim 22 wherein the tooth of each of said digging tooth assemblies is configured such that said cavity defined therein has a generally rhombus-like cross-sectional configuration.
33. The invention according to Claim 22 wherein the tooth of each of said digging tooth assemblies defines a pair of axially aligned bores opening to the cavity of said tooth and are disposed along an axis extending at an angle ranging between about 25° and about 65° relative to the transversely extending edge at the forward end of said tooth.
34. The invention according to Claim 22 wherein the rear laterally widened portion on each wing of the digging tooth extends laterally and forward from the rear end of the digging tooth.
35. A ground engaging tooth adapted to be mounted to a digging implement and having a wear component arranged rearwardly thereof after being mounted on said digging implement, said ground engaging tooth defining a central axis and has a forward end portion, with a cutting edge extending transversely thereacross, a rear end portion, upper and lower angularly diverging surfaces having opposed side surfaces therebetween, and wherein said tooth is further provided with a free ended projection integrally formed with a remainder of said tooth and extending away from and longitudinally along at least one surface of said tooth between the rear end portion and forward end portion thereof, with a rear portion of said projection extending away from said at least one surface of said tooth a greater distance than does a forward portion thereof such that an outer edge of said projection, between the forward and rearward portions thereof, converges

toward the central axis and such that, following initial ground penetration, the outer edge of the projection is disposed to initially fracture the ground through which said tooth passes whereby reducing wear on the wear component arranged rearwardly of the digging tooth.

36. The ground engaging tooth according to Claim 35 wherein said projection extends away from the upper surface of said tooth and generally normal to the cutting edge extending transversely across the forward end of said tooth.

37. The ground engaging tooth according to Claim 35 wherein said projection is laterally offset relative to the upper surface of said tooth such that said projection is disposed closer to one side surface of said tooth than the other.

38. The ground engaging tooth according to Claim 35 wherein said projection extends vertically from and longitudinally along an area on said upper surface generally centralized between the side surfaces on said tooth.

39. The ground engaging tooth according to Claim 35 wherein said projection has first and second surfaces which, toward the outer edge thereof, converge relative to each other to provide a cutting edge for said projection.

40. The ground engaging tooth according to Claim 35 wherein the rear end portion of said tooth defines a blind cavity opening to a rear of said tooth for receiving and accommodating a

lengthwise section of a nose portion of an adapter extending from a transversely extending edge on the digging implement.

41. The ground engaging tooth according to Claim 40 wherein the blind cavity opening to the rear of said tooth has a cross-sectional profile having a generally rhombus-like cross-sectional configuration for a major lengthwise portion thereof.

42. The ground engaging tooth according to Claim 40 wherein the blind cavity at the rear end portion of said tooth has a cross-sectional profile with a generally rectangular configuration for a major lengthwise portion thereof.

43. The ground engaging tooth according to Claim 40 wherein said projection has upper and lower generally parallel surfaces extending laterally outward from one side surface on said tooth, with the upper and lower surfaces of said projection being disposed between and in other than planar relationship relative to the upper and lower surfaces of said tooth.

44. The ground engaging tooth according to Claim 43 wherein the laterally widened rear portion of said projection extends outward and forward from the rear of said tooth

45. The ground engaging tooth according to Claim 40 wherein said projection laterally extends outwardly from one side surface on said tooth proximately midway between said upper and lower surfaces and in a direction generally parallel to the cutting edge extending transversely

across the forward end portion of said tooth.

46. The ground engaging tooth according to Claim 45 wherein said projection is disposed generally symmetrical relative to said central axis whereby permitting said tooth to be reversed about said central axis.

47. The ground engaging tooth according to Claim 43 further including a second free ended projection configured as a mirror image of the other free ended projection and having upper and lower generally planar surfaces, with said second free ended projection extending laterally outward from the other side surface on said tooth.

48. The ground engaging tooth according to Claim 47 wherein said second projection extends laterally outward from the other side surface of said tooth proximately midway between said upper and lower surfaces and in a direction generally parallel to the cutting edge extending transversely across the forward end of said tooth.

49. The ground engaging tooth according to Claim 47 wherein a rearward portion of each projection laterally extending from a respective side surface of the tooth has an upper generally planar and generally horizontal surface.

50. The ground engaging tooth according to Claim 49 wherein said tooth further defines a bore having an axis extending generally normal to the central axis of said tooth, with said bore

opening to said blind cavity defined by said tooth for accommodating at least a lengthwise portion of a retaining apparatus used to releasably secure said tooth and said adapter in operable combination relative to each other.

51. The ground engaging tooth according to Claim 50 wherein the upper generally planar surface of each projection on said tooth further defines an open top channel arranged in general alignment with the axis of said throughbore for accommodating and aligning said retaining apparatus with said throughbore.

52. The ground engaging tooth according to Claim 50 wherein said retaining apparatus used to releasably secure said tooth and said adapter in operable combination relative to each other includes an elongated flex-pin, and wherein an area of said tooth arranged in proximate relation relative to said bore defined by said tooth is configured to compress said flex-pin as said flex-pin is inserted into a position to maintain said tooth and adapter in operable combination relative to each other.

53. The ground engaging tooth according to Claim 50 wherein an area of said tooth arranged in proximate relation relative to said bore defined by said tooth is configured to inhibit inadvertent axial shifting of said retaining apparatus relative to said adapter or tooth.

54. The ground engaging tooth according to Claim 50 wherein the upper generally planar surface of each projection on said tooth is configured to protect a lengthwise portion of said

retaining apparatus extending beyond opposed sides of said tooth.

55. A ground engaging tooth adapted to be mounted to a digging implement and having a wear component arranged rearwardly thereof after being mounted on said digging implement, said ground engaging tooth defining a central axis and has a forward end portion, with a cutting edge extending transversely thereacross, a rear end portion, upper and lower angularly diverging surfaces having opposed side surfaces therebetween, and wherein said tooth is further provided with a first projection extending away from and longitudinally along at least a lengthwise portion of at one surface on said tooth, with the lengthwise portion of said projection having a length less than a length between the forward and rearward end portions of said tooth, and a second projection extending from said at least one surface on said tooth rearward of and in general longitudinal alignment with said first projection, with each of said first and second projections having an outer edge, and with said first and second projections being configured to combine with each other to fracture the ground through which said tooth passes whereby reducing wear on the wear component arranged rearwardly of the digging tooth.

56. The ground engaging tooth according to Claim 55 wherein the rear end portion of said digging tooth defines a blind cavity opening to a rear of said tooth for receiving and accommodating a lengthwise section of a nose portion of an adapter extending forwardly from a leading edge of the digging implement.

57. The ground engaging tooth according to Claim 56 wherein the blind cavity opening to the

rear of said tooth has a cross-sectional profile having a generally rhombus-like cross-sectional configuration for a major lengthwise portion thereof.

58. The ground engaging tooth according to Claim 56 wherein the blind cavity at the rear end portion of said tooth has a cross-sectional profile with a generally rectangular configuration for a major lengthwise portion thereof.

59. The ground engaging tooth according to Claim 55 further including a third and fourth projections extending from another surface on said tooth disposed in opposed relation relative to said at least one surface, with said third and fourth projections being configured as a mirror image of the said first and second projections, respectively.

60. An elongated digging tooth for a two-piece digging tooth assembly adapted to be secured to a transversely extending edge of a bucket or the like, said digging tooth defining a central axis and having a front end, with a cutting edge transversely extending thereacross, a rear end having a blind cavity opening thereto for receiving and accommodating a nose portion of an adapter extending forward from the transversely extending edge of the bucket, with said tooth and said adapter each defining a bore which are arranged in registry with one another after said digging tooth and adapter are conjoined so as to allow a retaining apparatus to pass at least partially through said bores whereby maintaining said tooth and adapter in operable combination with each other, and wherein the bore defined by said tooth defines an axis extending generally normal to the central axis of said tooth, with said digging tooth further including an upper surface

extending forward and downwardly from the rearward end and toward the cutting edge of said digging tooth, and a lower surface extending forward and upwardly from the rearward end and toward the cutting edge of said digging tooth, and with said digging tooth further including a generally horizontal projection extending laterally outward from an area on one side of said tooth, with said projection having generally parallel and horizontal upper and lower surfaces, with said projection having a laterally widened rear portion, disposed forward of the axis defined by the bore in said tooth and an outer edge extending forward from the laterally widened rear portion of the projection and converging toward the central axis of said tooth whereby providing said digging tooth with a progressively widening ground penetration zone for facilitating penetration of said bucket edge.

61. The elongated digging tooth according to Claim 60 wherein said projection is integrally formed as part of and with the remainder of said tooth.

62. The elongated digging tooth according to Claim 60 wherein said tooth is configured such that a marginal edge extending about said cavity opening to the rear end of the tooth has a generally rectangular-like cross-sectional configuration.

63. The elongated digging tooth according to Claim 60 wherein said projection is arranged on said tooth in generally symmetrical relation relative to said central axis whereby permitting said tooth to be reversed about said central axis.



64. An elongated digging tooth for a two-piece digging tooth assembly adapted to be secured to a transversely extending edge of a bucket or the like, said digging tooth defining a central axis and having a front end, with a cutting edge transversely extending thereacross, a rear end having a blind cavity opening thereto for receiving and accommodating a nose portion of an adapter extending forward from the transversely extending edge of the bucket, with said tooth and said adapter each defining a bore which are arranged in registry with one another after said digging tooth and adapter are conjoined so as to allow a retaining apparatus to pass at least partially through said bores whereby maintaining said tooth and adapter in operable combination with each other, and wherein the bore defined by said tooth defines an axis extending generally normal to the central axis of said tooth, with said digging tooth further including an upper surface extending forward and downwardly from the rearward end and toward the cutting edge of said digging tooth, and a lower surface extending forward and upwardly from the rearward end and toward the cutting edge of said digging tooth, and with said digging tooth further including a generally horizontal projection extending laterally outward from an area on one side of said tooth, with said projection having upper and lower surfaces disposed between and in other than planar relationship relative to the upper and lower surfaces of said digging tooth, and with said projection being disposed rearward of the axis defined by the bore in said tooth and the rear end of said tooth whereby providing said digging tooth with a progressively widening ground penetration zone for facilitating penetration of said bucket edge.

65. The elongated digging tooth according to Claim 64 wherein said projection is integrally formed as part of and with the remainder of said tooth.

66. The elongated digging tooth according to Claim 64 wherein the projection on said tooth has at least one vertically angled forward facing surface for enhancing the ability of said projection to fracture the ground in advance of and thereby protect the transversely extending edge of the bucket against wear.